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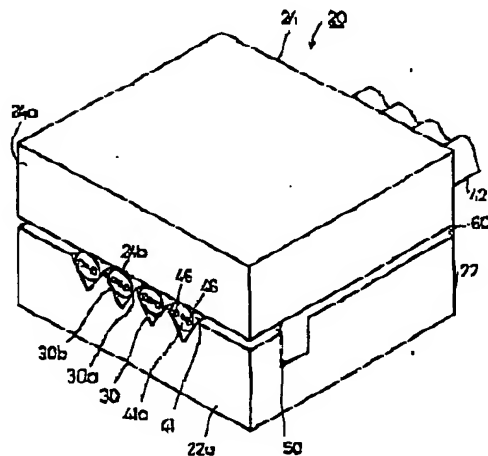
(54) 【発明の名称】 光ファイバアレイおよびその基板

(57) 【要約】

【目的】 組み立て時の研磨が不用であり、また、偏波面保存ファイバの偏波面を精度よく合わせることもできる光ファイバアレイおよびその基板を提供する。

【構成】 基板22の上面部22aに、一定の間隔ずつそれぞれ離間して、V溝30を互いに平行に設ける。V溝30の端部に連通して、偏波面保存ファイバ41の樹脂製被覆部分42を挿入するための凹部32を設ける。V溝30を横切って基板22の一側面から反対側の側面にまで延在する溝50を設ける。偏波面保存ファイバ41をV溝30内に配設する。樹脂系接着剤60を、溝50よりも後方部分を覆うように塗布する。押さえ部材24を偏波面保存ファイバ41の上方に配設する。樹脂系接着剤60により、偏波面保存ファイバ41、基板22および押さえ部材24を一体的に固着する。

FIG.4



【特許請求の範囲】

【請求項1】 基板に形成された複数のV溝にそれぞれ光ファイバを並列して収納し、前記光ファイバを押さえ部材で保持した状態で、前記光ファイバと前記基板と前記押さえ部材とが接着剤によって一体的に固着された光ファイバアレイにおいて、

前記複数のV溝を横切る溝をさらに設けたことを特徴とする光ファイバアレイ。

【請求項2】 請求項1記載の光ファイバアレイにおいて、前記光ファイバが偏波面保存ファイバであることを特徴とする光ファイバアレイ。

【請求項3】 請求項1記載の光ファイバアレイにおいて、前記溝が前記基板の側面から反対側の側面まで延在して設けられていることを特徴とする光ファイバアレイ。

【請求項4】 複数の光ファイバを並列して収納するV溝を有し、押さえ部材とともに前記光ファイバと接着剤によって一体的に固着される光ファイバアレイの基板において、

前記複数のV溝を横切る溝をさらに設けたことを特徴とする光ファイバアレイの基板。

【請求項5】 請求項4記載の光ファイバアレイの基板において、前記光ファイバが偏波面保存ファイバであることを特徴とする光ファイバアレイの基板。

【請求項6】 請求項4記載の光ファイバアレイの基板において、前記溝が前記基板の側面から反対側の側面まで延在して設けられていることを特徴とする光ファイバアレイの基板。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、光ファイバアレイおよびその基板に関し、特に、複数の光ファイバを並列して固定するための光ファイバアレイおよびその基板に関する。

【0003】

【従来の技術】 光ファイバ通信システム等においては、複数の光ファイバを所定の間隔ずつ離間して並列固定させた光ファイバアレイが使用されている。この光ファイバアレイは、通常、図6に示すような基板22と押さえ部材24とを備えている。また、図7に示すように、この基板22の上平面部22aに所定間隔ずつ離間して複数のV溝30が形成されている。そして、基板22のV溝30に光ファイバ40が配設された後、押さえ部材24がこの光ファイバ40の外周端部に当接した状態で、樹脂系接着剤60等を介して前記基板22と光ファイバ40と押さえ部材24とが一体的に固着されている。

【0003】

【発明が解決しようとする課題】 上述した光ファイバアレイにおいては、光導波路等との接続をとるために、光ファイバ40の先端面、基板22の側平面部22a、お

よび押さえ部材24の側平面部24aは同一平面内に配設されている。このため、樹脂系接着剤60によってこれらを接着する際に、樹脂系接着剤60が基板22および押さえ部材24の側平面部22a、24aからはみだし、光ファイバ40の先端面40aにも樹脂系接着剤60が付着してしまうという問題があった。

【0004】 光ファイバ40の先端面40aに樹脂系接着剤60が付着すると、光がほとんど透過しなくなるから、この付着した樹脂系接着剤60を除去するために研磨工程が必要となっていた。

【0005】 さらに、光ファイバ40に偏波面保存ファイバ41を使用した場合には、その先端面41aに樹脂系接着剤60が付着していると、偏波面を合わせることも困難となる。偏波面保存ファイバ41は、図8に示すように、コア44の両側に設けられた応力付与部46、46を介して所定の方向に偏波面を形成している。従って、偏波面保存ファイバ41を使用する場合には、偏波面を一定の方向に合わせないと、偏波面保存ファイバ41からの出射光の偏波角度がずれてしまい、この光ファイバアレイを他の素子と組み合わせる場合に、素子中に、偏波角度のずれた光を入射させてしまう。このために光ファイバ40に偏波面保存ファイバ41を使用して光ファイバアレイを製造する場合には、V溝30内で偏波面保存ファイバ41を回転させて所定の角度に偏波面を調整する必要がある。この調整は、偏波面保存ファイバ41の先端面41aをCCDカメラで観察しながら応力付与部46の方向を所定の角度に調整するか、偏光子および光検出器をファイバアレイの前段に配置することにより光学系を組み立て、実際に光を入射させて、ファイバアレイ端面41aからの出射光の偏光方向を測定しつつ偏波面を所定の角度に調整するか、により行われている。いずれの調整方法においても、偏波面保存ファイバ41の先端面41aに樹脂系接着剤60が付着していると、CCDカメラで観察することも困難となり、また、ファイバアレイからの出射光の偏光度も付着した接着剤により大幅に劣化するから、偏波面を合わせることも困難となる。従って、たとえ、その後研磨により樹脂系接着剤60を除去しても、偏波面が合っていないから、偏波面保存ファイバアレイとしてはもはや使用できなくなってしまう。

【0006】 そこで、本発明者等は、図9に示すように、偏波面保存ファイバ41の先端面41aを基板22および押さえ部材24の側平面部22a、24aよりも0.5～1mm程度飛び出すように配設させる方法を案出した。この方法によれば、基板22上に偏波面保存ファイバ41を載置した状態で樹脂系接着剤60を塗布したのち、押さえ部材24を搭載したとき、これらの側平面部22a、24aからはみだした樹脂系接着剤60が、偏波面保存ファイバ41の先端面41aに付着することは防止でき、従って、偏波面保存ファイバ41の偏

wを0.7mmとした。

【0023】なお、樹脂系接着剤60を塗布してから、偏波面保存ファイバ41の偏波面の角度を制御した。また、樹脂系接着剤60としては、エポテック353NDを使用した。

【0024】次に、図4に示すように、押さえ部材24を偏波面保存ファイバ41の上方に配設する。このとき、押さえ部材24の側平面部24aと、基板22の側平面部22aおよび偏波面保存ファイバ41の先端面41aとは同一平面内にあるように、押さえ部材24を配設する。

【0025】押さえ部材24を上方より軽く押圧しながら、偏波面保存ファイバ41の偏波面を所定の方向に合わせろ。この偏波面の調整は、偏波面保存ファイバ41の先端面41aをCCDカメラで観察しながら応力付与部46の方向を所定の角度に調整するか、偏光子および光検出器を光ファイバアレイの前後に配置することにより光半系を組み立て、実際に光を入射させて、出射光の偏光方向を測定しつつ偏波面を所定の角度に調整するか、のいずれかにより行うことができる。この場合、本実施例においては、溝50が設けられているから、樹脂系接着剤60が、基板22および押さえ部材24の側平面部22a、24aからはみだし、偏波面保存ファイバ41の先端面41aに付着することを防止でき、従って、上記いずれの調整方法においても、容易に偏波面の調整を行うことができる。

【0026】その後、押さえ部材24を上方より、より強く押圧しながら、樹脂系接着剤60によって偏波面保存ファイバ41、基板22および押さえ部材24を固着して光ファイバアレイ20を製造する。この場合においても、溝50が設けられているから、樹脂系接着剤60が、基板22および押さえ部材24の側平面部22a、24aからはみだし、偏波面保存ファイバ41の先端面41aに付着することを防止できる。従って、組み立て後においても、樹脂系接着剤60を除去するための研磨を行う必要がなくなる。

【0027】さらに、このように複数のV溝30を横切る溝50により、樹脂系接着剤60が偏波面保存ファイバ41の先端面41aに付着することが防止できるから、偏波面保存ファイバ41の先端面41aを基板22および押さえ部材24の側平面部22a、24aからはみだして設ける必要もなくなる。その結果、その後偏波面保存ファイバ41の先端部を研磨する必要もなくなるから、偏波面保存ファイバ41の研磨によって偏波面が所定の方向からずれることも防止できる。

【0028】なお偏波面保存ファイバ41は、V溝30の側面40aおよび40b並びに押さえ部材24の下平面24bの3点により支持されている。

【0029】また、本実施例においては、図3に示すように、押さえ部材24を配設する前に偏波面保存ファイ

バ41の偏波面を粗調整したが、そのような粗調整を行わずに、押さえ部材24を配設した後に、初めて偏波面の調整を行ってよい。

【0030】さらに、本実施例においては、偏波面保存ファイバ41の先端面41a、基板22の側平面部22a、および押さえ部材24の側平面部24aが同一平面内にあり、さらに、樹脂系接着剤60も偏波面保存ファイバ41の先端面41aに付着しないから、研磨工程を必要としない。しかしながら、偏波面保存ファイバ41の先端面41a、基板22の側平面部22aおよび押さえ部材24の側平面部24aを同一平面内にあるように調整するには、通常は目視で偏波面保存ファイバ41の先端面41aの突き出し量を等にするようにして行うから、微妙な偏波面保存ファイバ41の先端面41aの突き出し、引っ込みが残存する。そこで、先端面41aの突き出し量のより精密な制御が求められる場合には、端面研磨を行うこともできる。

【0031】本実施例においては、所定の方向からの偏波面のズレを $\pm 1^\circ$ 以内に抑えることができた。これに対して、図9に示した偏波面保存ファイバ41の先端面41aを突き出し、おきその後研磨する方法では、研磨前後で、偏波面のずれが約 $\pm 5^\circ$ も生じ、その結果所定の方向からのずれも約 $\pm 5^\circ$ と大きかった。

【0032】図5は、本発明の他の実施例を説明するための斜視図である。押さえ部材24に接着剤注入口38が設けられている点が前述した実施例と異なっている。本実施例においては、偏波面保存ファイバ41を基板22のV溝30内に配設し、その後押さえ部材24を偏波面保存ファイバ41上に配設した後に、接着剤注入口38から、樹脂系接着剤60を充填して偏波面保存ファイバ41、基板22および押さえ部材24を出着する。本実施例においても、溝50が設けられているから、樹脂系接着剤60が基板22および押さえ部材24の側平面部22a、24aからはみだし、偏波面保存ファイバ41の先端面41aに付着することを防止できる。従って、組み立て中に容易に偏波面の調整をできるばかりでなく、組み立て後においても、樹脂系接着剤60を除去するための研磨も行う必要がなくなる。

【0033】なお、上記いずれの実施例においても偏波面保存ファイバ41を用いた光ファイバアレイについて説明したが、本発明は応力付与部46を有しない通常の光ファイバ40を用いた光ファイバアレイにも適用できる。この場合においても、溝50により、樹脂系接着剤60が基板22および押さえ部材24の側平面部22a、24aからはみだし、光ファイバ40の先端面40aに付着することを防止できる。従って、組み立て後において、樹脂系接着剤60を除去するための研磨も行う必要がなくなる。

【0034】また、溝50の断面形状は、上記実施例の形状に限定されるものではなく、例えば、V字状の断面

形状のものでよい。

【0035】

【発明の効果】本発明においては、複数のV溝を横切る溝が設けてあるから、接着剤は溝内に流れ出す。従って、接着剤が基板および押さえ部材の側平面部からはみだして光ファイバの先端面に付着することを防止できる。その結果、光ファイバアレイの組み立て後に接着剤を除去するために研削を行う必要がなくなる。

【0036】さらに、このように複数のV溝を横切る溝により、接着剤が光ファイバの先端面に付着することが防止できるから、光ファイバとして、偏波面保存ファイバを用いた場合であっても、偏波面保存ファイバの先端面を基板および押さえ部材の側平面部からはみだして脱ける必要もなくなる。その結果、その後偏波面保存ファイバの先端部を研削する必要もなくなるから、偏波面保存ファイバの研削によって偏波面が所定方向からずれることも防止できる。従って、正確かつ容易に偏波面の調整を行うことができるようになる。

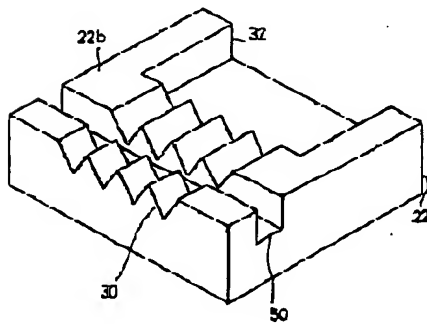
【図面の簡単な説明】

【図1】本発明の一実施例を説明するための斜視図である。

【図2】本発明の一実施例を説明するための斜視図である。

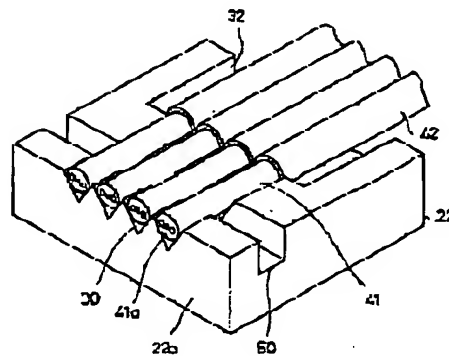
【図1】

FIG.1



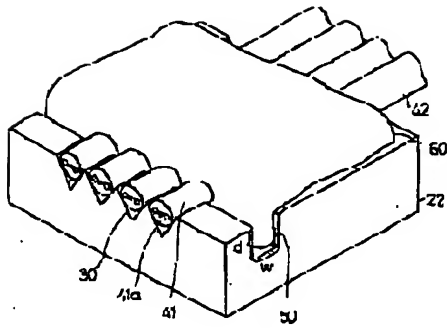
【図2】

FIG.2



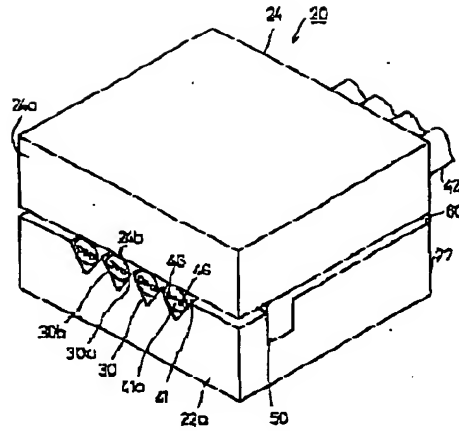
【図3】

FIG.3



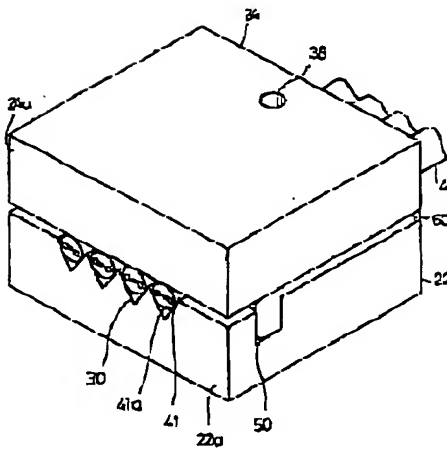
【図4】

FIG.4



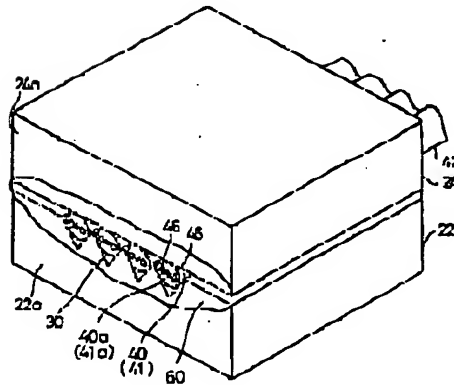
【図5】

FIG.5



【図6】

FIG.6

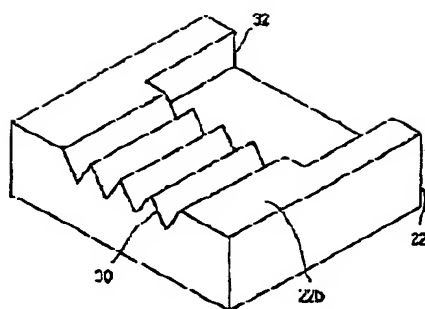


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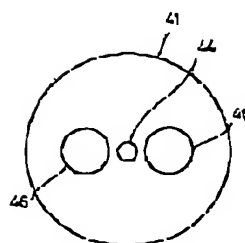
【図7】

FIG.7



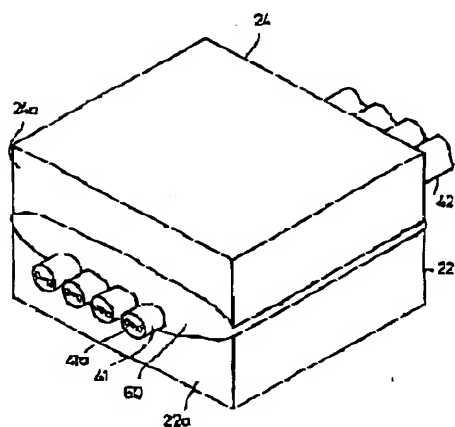
【図8】

FIG.8



【図9】

FIG.9





[JP,05-303027,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF
DRAWINGS DRAWINGS

[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] The optical fiber array characterized by preparing further the slot where the aforementioned optical fiber, the aforementioned substrate, and the aforementioned presser-foot member cross two or more aforementioned V grooves in the optical fiber array which fixed in one with adhesives in the state where contained the optical fiber in line to two or more V grooves formed in the substrate, respectively, pressed down the aforementioned optical fiber, and it held by the member.

[Claim 2] The optical fiber array characterized by the aforementioned optical fiber being a plane-of-polarization preservation fiber in an optical fiber array according to claim 1.

[Claim 3] The optical fiber array characterized by for the aforementioned slot extending and preparing it from the unilateral side of the aforementioned substrate to the side of an opposite side in an optical fiber array according to claim 1.

[Claim 4] The substrate of the optical fiber array characterized by preparing further the slot which crosses two or more aforementioned V grooves in the substrate of the optical fiber array which has the V groove which aligns and contains two or more optical fibers, and fixes in one with the aforementioned optical fiber and adhesives with a presser-foot member.

[Claim 5] The substrate of the optical fiber array characterized by the aforementioned optical fiber being a plane-of-polarization preservation fiber in the substrate of an optical fiber array according to claim 4.

[Claim 6] The substrate of the optical fiber array characterized by for the aforementioned slot extending and preparing it from the unilateral side of the aforementioned substrate to the side of an opposite side in the substrate of an optical fiber array according to claim 4.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the optical fiber array for fixing two or more optical fibers in line especially about an optical fiber array and its substrate, and its substrate.

[0002]

[Description of the Prior Art] In optical fiber communication system etc., the optical fiber array which predetermined estranged [array] two or more optical fibers the interval every, and carried out alignment fixation is used. This optical fiber array usually pressed down with the substrate 22 as shown in drawing 6, and is equipped with the member 24. Moreover, as shown in drawing 7, it estranges to upper flat-surface section 22b of this substrate 22 a predetermined interval every, and two or more V grooves 30 are formed in it. And after an optical fiber 40 is arranged in V groove 30 of a substrate 22, it pressed down and the member 24 has contacted the periphery edge of this optical fiber 40, it pressed down with the aforementioned substrate 22 and the optical fiber 40 through the resin system adhesives 60 grade, and the member 24 has fixed in one.

[0003]

[Problem(s) to be Solved by the Invention] in order to take connection with an optical waveguide etc. in the optical fiber array mentioned above -- side flat-surface section 22a of the apical surface of an optical fiber 40, and a substrate 22, and a presser foot -- side flat-surface section 24a of a member 24 is arranged in the same flat surface For this reason, when pasting these up with the resin system adhesives 60, it pressed down, and from the side flat-surface sections 22a and 24a of a member 24, it disturbed and the substrate 22 and the problem of an optical fiber 40 that the resin system adhesives 60 will adhere also to apical surface 40a had the resin system adhesives 60.

[0004] When the resin system adhesives 60 adhered to apical surface 40a of an optical fiber 40, since light stopped having almost penetrated, the polish process was needed in order to remove these adhering resin system adhesives 60.

[0005] Furthermore, if the resin system adhesives 60 have adhered to the apical surface 41a when the plane-of-polarization preservation fiber 41 is used for an optical fiber 40, it will also become difficult to double plane of polarization. The plane-of-polarization preservation fiber 41 forms plane of polarization in the predetermined direction through the stress grant sections 46 and 46 prepared in the both sides of a core 44, as shown in drawing 8. Therefore, when the plane-of-polarization preservation fiber 41 was used, plane of polarization was not doubled in the fixed direction, the polarization angle of the outgoing radiation light from the plane-of-polarization preservation fiber 41 shifts and this optical fiber array is combined with other elements, incidence of the light from which the polarization angle shifted into the element will be carried out. For this reason, when manufacturing an optical fiber array to an optical fiber 40 using the plane-of-polarization preservation fiber 41, it is necessary to rotate the plane-of-polarization preservation fiber 41 within V groove 30, and to adjust plane of polarization to a predetermined angle. Assembling optical system, actually carrying out incidence of the light, and measuring the polarization direction of the outgoing radiation light from fiber array end-face 41a by adjusting the direction of the stress grant section 46 to a predetermined angle, or arranging a polarizer and a light sensitive cell before

and after a fiber array, observing apical surface 41a of the plane-of-polarization preservation fiber 41 by the CCD camera, this adjustment adjusts plane of polarization to a predetermined angle, or boils it, and is performed more. Also in which adjustment method, if the resin system adhesives 60 have adhered to apical surface 41a of the plane-of-polarization preservation fiber 41, since it will deteriorate sharply with the adhesives to which observing by the CCD camera also became difficult, and the degree of polarization of the outgoing radiation light from a fiber array also adhered, it becomes difficult to double plane of polarization. Since plane of polarization is not correct even if polish removes the resin system adhesives 60 after that, it will become impossible therefore, to already use it as a plane-of-polarization preservation fiber array.

[0006] Then, this invention persons thought out the substrate 22 and the method of making it arrange so that it may press down and may jump out about 0.5-1mm rather than the side flat-surface sections 22a and 24a of a member 24 for apical surface 41a of the plane-of-polarization preservation fiber 41, as shown in drawing 9. When it presses down and a member 24 is carried after applying the resin system adhesives 60 according to this method, where the plane-of-polarization preservation fiber 41 is laid on a substrate 22 From the side flat-surface sections 22a and 24a of these, it can be prevented that the resin system adhesives 60 which disturbed adhere to apical surface 41a of the plane-of-polarization preservation fiber 41, therefore it can double now the plane of polarization of the plane-of-polarization preservation fiber 41 in the predetermined direction.

[0007] however, it is ****, while making apical surface 41a of the plane-of-polarization preservation fiber 41, and the side flat-surface sections 22a and 24a into the thing in the same flat surface, since the point and the resin system adhesives 60 of the plane-of-polarization preservation fiber 41 are disturbing from the side flat-surface sections 22a and 24a also by this method -- in order to remove the resin system adhesives 60 carried out, a polish process is needed too

[0008] Furthermore, in a longitudinal direction, the stress grant section 46 is rotating the plane-of-polarization preservation fiber 41 to some extent in the interior. In the case of being large, this rotation becomes no less than 2-3 degrees per mm. And rotation of this stress grant section 46 is random at the longitudinal direction of the plane-of-polarization preservation fiber 41. Therefore, even if it doubled the plane of polarization of the plane-of-polarization preservation fiber 41 by the apical surface 41a which it began to attach, when plane of polarization shifted from a predetermined direction by subsequent polish, consequently the polarization angle of the outgoing radiation light from the plane-of-polarization preservation fiber 41 shifted and this optical fiber array was combined with other elements, there was a problem of carrying out incidence of the light from which the polarization angle shifted into the element.

[0009] Therefore, the purpose of this invention has the polish at the time of an assembly in offering a unnecessary optical fiber array and its substrate.

[0010] Moreover, other purposes of this invention are to offer the optical fiber array which can double the plane of polarization of a plane-of-polarization preservation fiber with a sufficient precision, and its substrate.

[0011]

[Means for Solving the Problem] The optical fiber array characterized by preparing further the slot where the aforementioned optical fiber, the aforementioned substrate, and the aforementioned presser-foot member cross two or more aforementioned V grooves in the optical fiber array which fixed in one with adhesives in the state where according to this invention contained the optical fiber in line to two or more V grooves formed in the substrate, respectively, pressed down the aforementioned optical fiber, and it held by the member is obtained.

[0012] Furthermore, according to this invention, it has the V groove which aligns and contains two or more optical fibers, and the substrate of the optical fiber array characterized by preparing further the slot which crosses two or more aforementioned V grooves is obtained in the substrate of the optical fiber array which fixes in one with the aforementioned optical fiber and adhesives with a presser-foot member.

[0013] A plane-of-polarization preservation fiber can be used as the aforementioned optical fiber.

[0014] Moreover, as for the aforementioned slot, it is desirable to be extended and prepared from the unilateral side of the aforementioned substrate to the side of an opposite side.

[0015]

[Function] In this invention, since the slot which crosses two or more V grooves is prepared, adhesives flow into Mizouchi. Therefore, adhesives can prevent a substrate and pressing down, disturbing from the side flat-surface section of a member, and adhering to the apical surface of an optical fiber. In order to remove adhesives after the assembly of a fiber array, it becomes unnecessary consequently, to grind.

[0016] furthermore -- since that adhesives adhere to the apical surface of an optical fiber can prevent by the slot which crosses two or more V grooves in this way, even if it is the case where a plane-of-polarization preservation fiber is used, as an optical fiber -- the apical surface of a plane-of-polarization preservation fiber -- a substrate and a presser foot -- it becomes unnecessary to disturb and prepare from the side flat-surface section of a member. Consequently, since it becomes unnecessary to grind the point of a plane-of-polarization preservation fiber after that, it can also be prevented by polish of a plane-of-polarization preservation fiber that plane of polarization shifts from a predetermined direction.

Therefore, plane of polarization can be adjusted now correctly and easily.

[0017] Moreover, adhesives can prevent a substrate and pressing down, disturbing from the side flat-surface section of a member, and adhering to the apical surface of an optical fiber more certainly by extending and preparing the slot which crosses two or more V grooves from the unilateral side of a substrate to the side of an opposite side.

[0018]

[Example] Hereafter, it explains with reference to the drawing of appending of the example of this invention.

[0019] Drawing 1 or drawing 4 is a perspective diagram for explaining one example of this invention.

[0020] it is shown in drawing 1 -- as -- every [an interval fixed to upper flat-surface section 22b of a substrate 22] -- it estranges, respectively and four V grooves 30 are formed in parallel mutually. The crevice 32 for it being open for free passage and inserting the covering portion 42 made of a resin of the plane-of-polarization preservation fiber 41 which carries out a postscript is formed in the edge of this V groove 30. Furthermore, the slot 50 which crosses V groove 30 and extends even from the unilateral side of a substrate 22 to the side of an opposite side is formed.

[0021] Next, as shown in drawing 2, after removing the covering portion 42 made of a resin which has covered the plane-of-polarization preservation fiber 41 covering predetermined length, the plane-of-polarization preservation fiber 41 exposed outside is arranged in V groove 30. At this time, apical surface 41a of the plane-of-polarization preservation fiber 41 arranges the plane-of-polarization preservation fiber 41, as it is in the same flat surface as side flat-surface section 22a of a substrate 22. In addition, the covering portion 42 made of a resin of the plane-of-polarization preservation fiber 41 is arranged in the crevice 32 of a substrate 22.

[0022] Next, as shown in drawing 3, it applies so that may be covered the resin system adhesives 60 rather than the slot 50 of a substrate 22 and a back portion and the covering portion 42 made of a resin in a crevice 32 may be covered rather than the slot 50 of a back portion and the plane-of-polarization preservation fiber 30. Since the resin system adhesives 60 flow in in a slot 50, ahead, they do not flow out rather than a slot 50. In order for adhesives 60 not to disturb ahead from a slot 50 and to secure sufficient adhesive strength, the resin system adhesives 60 need to flow in enough in a slot 50. For that purpose, a certain thing of depth d of a slot 50 is desirable 0.6mm or more, and a certain thing is [the width of face w of a slot 50] desirable 0.6mm or more. In this example, depth d was set to 1mm and width of face w was set to 0.7mm.

[0023] In addition, after applying the resin system adhesives 60, the coarse control of the angle of the plane of polarization of the plane-of-polarization preservation fiber 41 was carried out. Moreover, EPOTEKKU 353ND was used as resin system adhesives 60.

[0024] Next, as shown in drawing 4, it presses down and a member 24 is arranged above the plane-of-

polarization preservation fiber 41. At this time, as it presses down and is in the same flat surface, side flat-surface section 24a of a member 24, and side flat-surface section 22a of a substrate 22 and apical surface 41a of the plane-of-polarization preservation fiber 41 are pressed down, and arrange a member 24.

[0025] The plane of polarization of the plane-of-polarization preservation fiber 41 is doubled in the predetermined direction, pressing down and pressing a member 24 more lightly than the upper part. It can be performed depending on whether they are whether plane of polarization is adjusted to a predetermined angle, and *****, adjustment of this plane of polarization assembling optical system, making light actually put ON, and measuring the polarization direction of outgoing radiation light by adjusting the direction of the stress grant section 46 to a predetermined angle, or arranging a polarizer and a light sensitive cell before and after an optical fiber array, observing apical surface 41a of the plane-of-polarization preservation fiber 41 by the CCD camera. in this case -- since the slot 50 is formed in this example -- the resin system adhesives 60 -- a substrate 22 and a presser foot -- disturbing and adhering to apical surface 41a of the plane-of-polarization preservation fiber 41 from the side flat-surface sections 22a and 24a of a member 24, -- it can prevent -- therefore, the above -- also in which adjustment method, plane of polarization can be adjusted easily

[0026] then, a presser foot -- while pressing a member 24 more strongly than the upper part -- the resin system adhesives 60 -- the plane-of-polarization preservation fiber 41, a substrate 22, and a presser foot -- a member 24 is fixed and the optical fiber array 20 is manufactured Also in this case, since the slot 50 is formed, it presses down, and disturbs from the side flat-surface sections 22a and 24a of a member 24, and the resin system adhesives 60 can prevent a substrate 22 and adhering to apical surface 41a of the plane-of-polarization preservation fiber 41. It becomes unnecessary therefore, to perform polish for removing the resin system adhesives 60 after an assembly.

[0027] Since it can prevent that the resin system adhesives 60 adhere to apical surface 41a of the plane-of-polarization preservation fiber 41, it reaches substrate 22, apical surface 41a of the plane-of-polarization preservation fiber 41 is pressed down, and it becomes unnecessary furthermore, to disturb and prepare from the side flat-surface sections 22a and 24a of a member 24 by the slot 50 which crosses two or more V grooves 30 in this way. Consequently, since it becomes unnecessary to grind the point of the plane-of-polarization preservation fiber 41 after that, it can also be prevented by polish of the plane-of-polarization preservation fiber 41 that plane of polarization shifts from a predetermined direction.

[0028] In addition, the plane-of-polarization preservation fiber 41 is pressed down in side 30a of V groove 30, and 30b list, and is supported by three points of Shimohira side 24b of a member 24.

[0029] Moreover, in this example, although the coarse control of the plane of polarization of the plane-of-polarization preservation fiber 41 was carried out before pressing down and arranging a member 24, as shown in drawing 3, after pressing down and arranging a member 24, without performing such a coarse control, you may adjust plane of polarization for the first time.

[0030] furthermore, this example -- setting -- apical surface 41a of the plane-of-polarization preservation fiber 41, side flat-surface section 22a of a substrate 22, and a presser foot -- side flat-surface section 24a of a member 24 is in the same flat surface, and further, since the resin system adhesives 60 do not adhere to apical surface 41a of the plane-of-polarization preservation fiber 41, either, a polish process is not needed however, apical surface 41a of the plane-of-polarization preservation fiber 41, side flat-surface section 22a of a substrate 22, and a presser foot -- since it is usually visually performed as the amount of ejection of apical surface 41a of the plane-of-polarization preservation fiber 41 is made into zero in order to adjust side flat-surface section 24a of a member 24, as it is in the same flat surface, delicate ejection of apical surface 41a of the plane-of-polarization preservation fiber 41 and depression remain Then, when more precise control of the amount of ejection of apical surface 41a is called for, end-face polish can also be performed.

[0031] In this example, gap of the plane of polarization from a predetermined direction was able to be suppressed within **1 degree. On the other hand, by the method of projecting apical surface 41a of the plane-of-polarization preservation fiber 41 shown in drawing 9, and grinding after that, it was before

and after polish, about ± 5 degrees of gaps of plane of polarization arose, and the gap from the direction of result predetermined was also as large as about ± 5 degrees.

[0032] Drawing 5 is a perspective diagram for explaining other examples of this invention. It differs from one example which the point that pressed down and the adhesives inlet 38 was formed in the member 24 mentioned above. this example -- setting -- the plane-of-polarization preservation fiber 41 -- the inside of V groove 30 of a substrate 22 -- arranging -- after that -- a presser foot -- after arranging a member 24 on the plane-of-polarization preservation fiber 41 -- the adhesives inlet 38 to the resin system adhesives 60 -- being filled up -- the plane-of-polarization preservation fiber 41, a substrate 22, and a presser foot -- a member 24 is fixed Also in this example, since the slot 50 is formed, it presses down, and disturbs from the side flat-surface sections 22a and 24a of a member 24, and the resin system adhesives 60 can prevent a substrate 22 and adhering to apical surface 41a of the plane-of-polarization preservation fiber 41. It becomes unnecessary therefore, to also perform polish for it not only to be able to performing adjustment of plane of polarization easily during an assembly, but removing the resin system adhesives 60 after an assembly.

[0033] in addition, the above -- in which example, the optical fiber array using the plane-of-polarization preservation fiber 41 was explained, and this invention is applicable also to the optical fiber array using the usual optical fiber 40 which does not have the stress grant section 46 Also in this case, by the slot 50, it presses down, and disturbs from the side flat-surface sections 22a and 24a of a member 24, and the resin system adhesives 60 can prevent a substrate 22 and adhering to apical surface 40a of an optical fiber 40. It becomes unnecessary therefore, to also perform polish for removing the resin system adhesives 60 after an assembly.

[0034] Moreover, the cross-section configuration of a slot 50 may not be limited to the configuration of the above-mentioned example, and the thing of a V character-like cross-section configuration is sufficient as it.

[0035]

[Effect of the Invention] In this invention, since the slot which crosses two or more V grooves is prepared, adhesives flow into Mizouchi. Therefore, adhesives can prevent a substrate and pressing down, disturbing from the side flat-surface section of a member, and adhering to the apical surface of an optical fiber. In order to remove adhesives after the assembly of an optical fiber array, it becomes unnecessary consequently, to grind.

[0036] furthermore -- since that adhesives adhere to the apical surface of an optical fiber can prevent by the slot which crosses two or more V grooves in this way, even if it is the case where a plane-of-polarization preservation fiber is used, as an optical fiber -- the apical surface of a plane-of-polarization preservation fiber -- a substrate and a presser foot -- it becomes unnecessary to disturb and prepare from the side flat-surface section of a member Consequently, since it becomes unnecessary to grind the point of a plane-of-polarization preservation fiber after that, it can also be prevented by polish of a plane-of-polarization preservation fiber that plane of polarization shifts from a predetermined direction. Therefore, plane of polarization can be adjusted now correctly and easily.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is a perspective diagram for explaining one example of this invention.

[Drawing 2] It is a perspective diagram for explaining one example of this invention.

[Drawing 3] It is a perspective diagram for explaining one example of this invention.

[Drawing 4] It is a perspective diagram for explaining one example of this invention.

[Drawing 5] It is a perspective diagram for explaining other examples of this invention.

[Drawing 6] It is a perspective diagram for explaining the conventional optical fiber array.

[Drawing 7] It is a perspective diagram for explaining the conventional optical fiber array.

[Drawing 8] It is a cross section for explaining a plane-of-polarization preservation fiber.

[Drawing 9] It is a perspective diagram for explaining the optical fiber array which this invention persons thought out.

[Description of Notations]

20 -- Optical fiber array

22 -- Substrate

24 -- It presses down and is a member.

30 -- V groove

40 -- Optical fiber

41 -- Plane-of-polarization preservation fiber

50 -- Slot

60 -- Resin system adhesives

[Translation done.]

* NOTICES *

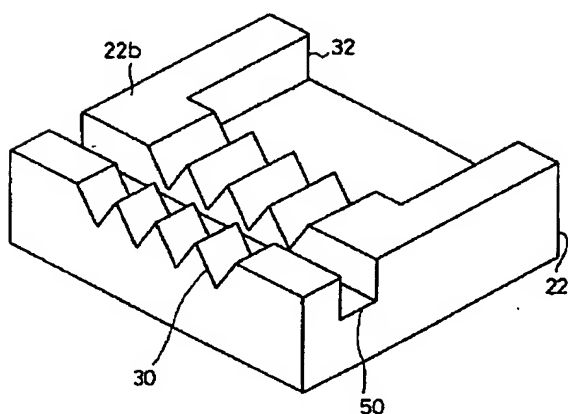
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DRAWINGS

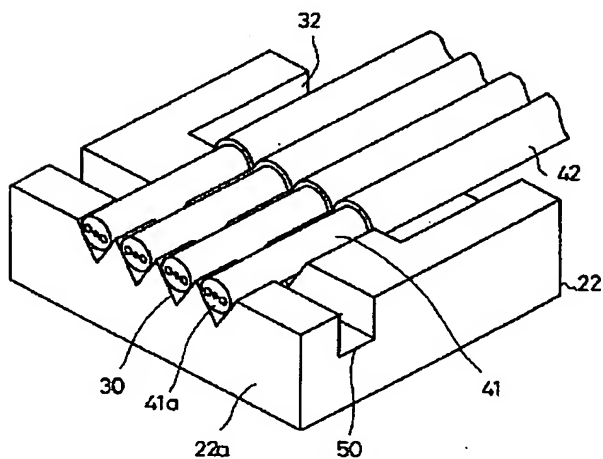
[Drawing 1]

FIG. 1



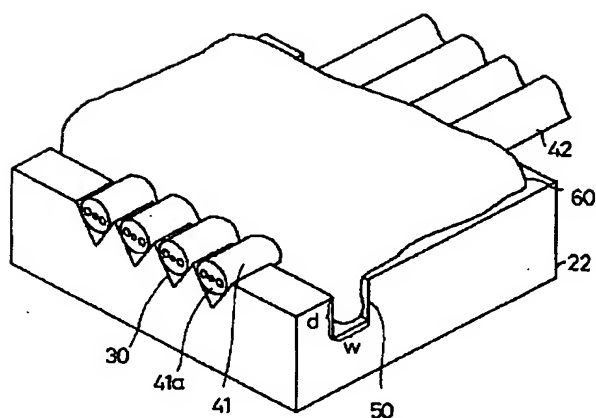
[Drawing 2]

FIG. 2



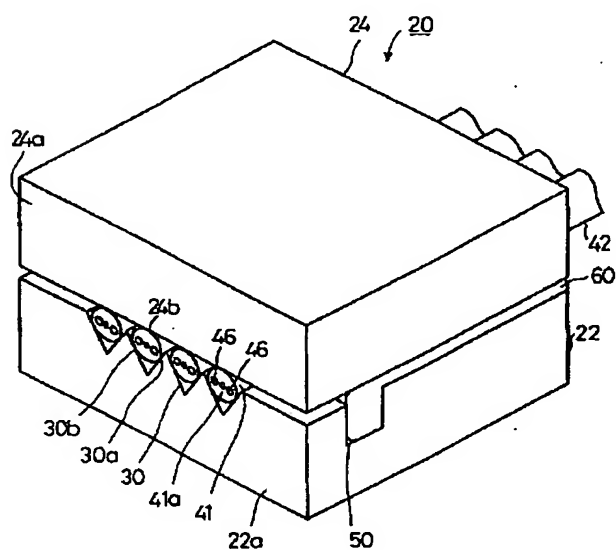
[Drawing 3]

FIG.3



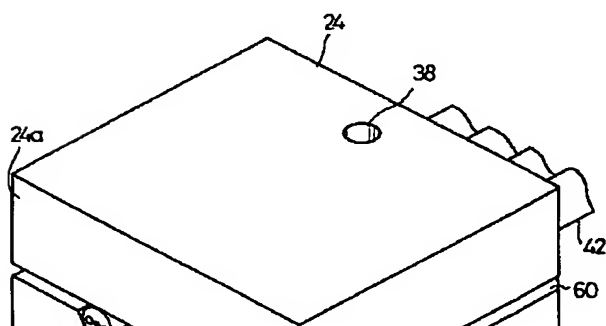
[Drawing 4]

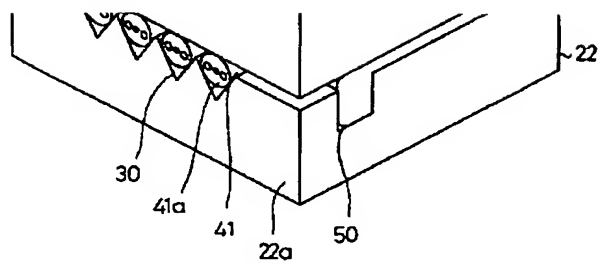
FIG.4



[Drawing 5]

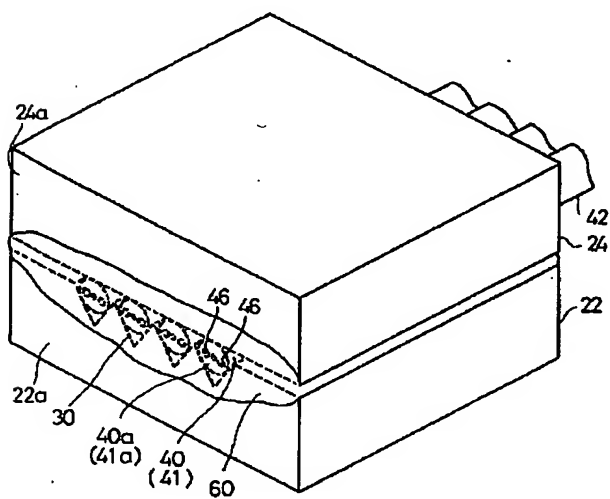
FIG.5





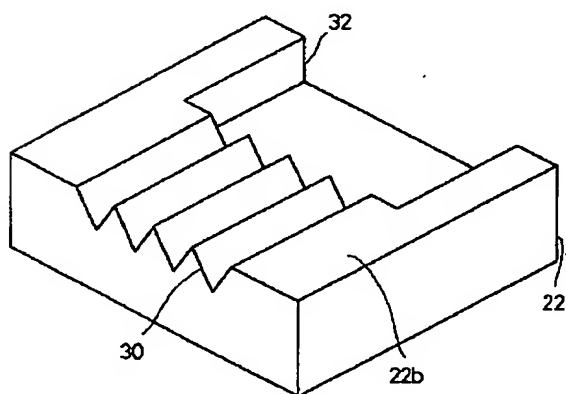
[Drawing 6]

FIG. 6



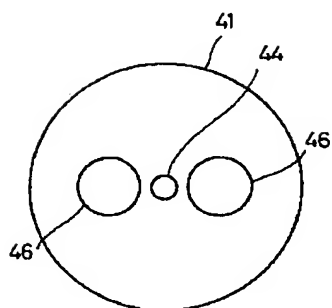
[Drawing 7]

FIG. 7



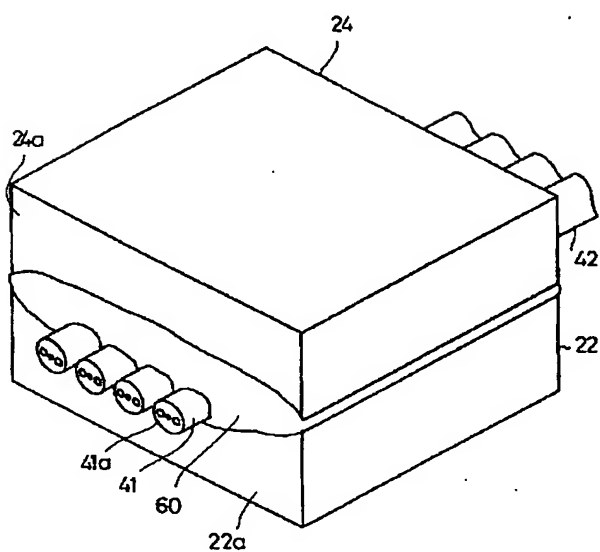
[Drawing 8]

FIG. 8



[Drawing 9]

FIG. 9



[Translation done.]